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ABSTRACT

This Missouri Vocational Instruction Management System instructor's drafting guide has been keyed to the drafting competency profile developed by state industry and education professionals. This unit contains information on pictorial drawings. The guide contains a cross-reference table of instructional materials. The unit contains the following: (1) unit and specific objectives; (2) suggested activities; (3) instructional materials; (4) unit content; (5) 15 references; (6) instructor notes; (7) information sheets; (8) lessons; (9) transparency masters; (10) handouts; (11) assignment sheets; (12) job sheets; and (13) unit test and answers. (NLA)

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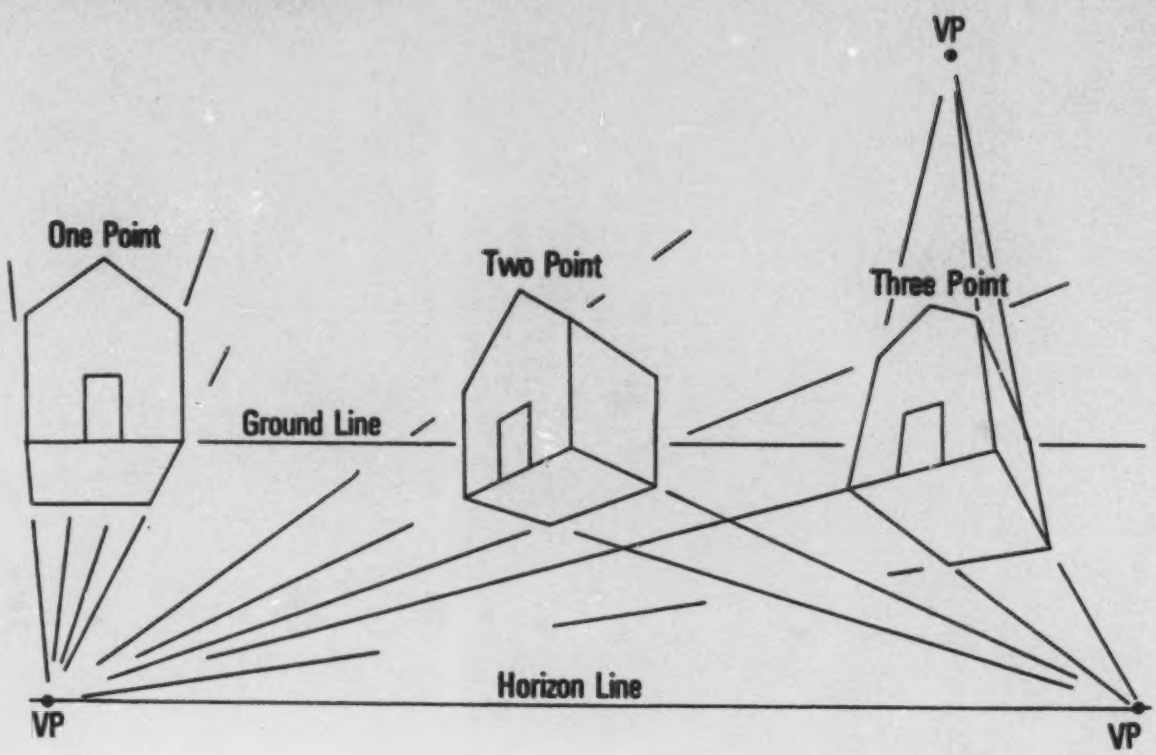
Module

5 Pictorial Drawings

70-4005-I
Instructor's Guide

ED336602



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Instructional Materials Laboratory, University of Missouri-Columbia, Columbia, Missouri

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DRAFTING
Module 5: Pictorial Drawings

Instructional Materials Laboratory
8 London Hall
University of Missouri-Columbia
Columbia, MO 65211

1991

Instructor's Guide
Catalog N. 70-4005-I

FORWARD

Once again, we are indebted to the teachers and administrators who provided their time, effort and professionalism to develop curriculum guides for trade, technical and industrial education programs. This drafting guide is an outstanding example of what can be accomplished when the right people with the right attitude get together. Committee members worked hard over several years' time in advisory, writing, technical consultation and field-test capacities.

This guide is designed to be totally integrated with the Vocational Instructional Management System. It is hoped that all guides produced under our supervision will help classroom teachers manage instruction. A curriculum guide is more than a resource--it is an integral part of the management system. Rather than impeding instruction, it should guide and facilitate instruction.

This guide's format has been set up for competency-based teaching and testing. Unit tests evaluate specific competencies and can be used with the Vocational Administrative Management System (VAMS). Information sheets, transparency masters, job sheets, assignments sheets and test items are keyed to specific competencies. A cross-reference table has been included to identify quickly the parts of the curriculum that relate to specific competencies. The material has also been packaged for students.

Although this guide may be a new format for some teachers, we are confident that, when used as designed, time spent by teachers and students will become more productive. Any future drafting curriculum modifications will begin with this guide. The drafting field is undergoing constant and considerable change. We will annually evaluate the need to update this guide on a module-by-module basis. Your suggestions regarding ares for improvement are both encouraged and appreciated.

Judith Moore, supervisor
Industrial Education
Department of Elementary and Secondary Education

Charles "Chuck" Waibel, director
Industrial Education
Department of Elementary and Secondary Education

ACKNOWLEDGEMENTS

This drafting guide represents a continuing commitment to Missouri's Vocational Instructional Management System (VIMS). The guide has been keyed to the drafting competency profile developed by industry and education professionals in the state.

When searching for current drafting materials to adopt or use in the guide's development, comparable materials were found from the Mid-America Vocational Curriculum Consortium (MAVCC), of which Missouri is a member. MAVCC materials, therefore, have been relied upon as a resource for this guide. A debt of thanks is owed to the entire MAVCC organization for the research and development of these drafting materials.

Special appreciation is given to the writers for their self-motivation, reliability and technical expertise.

Chuck Berendzen, Rolla Area Vocational Technical School, Rolla, MO
Don Block, Rolla Area Vocational Technical School, Rolla, MO
Earl Cross, Fort Osage Area Vocational Technical School, Independence, MO
Ken Franken, Linn Technical College, Linn, MO
Milton Moore, N. S. Hillyard Area Vocational Technical School, St. Joseph, MO
Greg Peck, Davis H. Hart Mexico Area Vocational Technical School, Mexico, MO
Kelli Engelbrecht, Tri-County Technical School, Eldon, MO
Arthur Hatch, Waynesville Area Vocational Technical School, Waynesville, MO
J. Clay Hunter, Sikeston Area Vocational Technical School, Sikeston, MO
Mike Starr, Moberly Area Vocational Technical School, Moberly, MO
Richard Faber, Laclede Area Vocational Technical Center, Lebanon, MO
Robert Fine, Excelsior Springs Area Vocational Technical School, Excelsior Springs, MO

Support and contributions of IML staff members were instrumental to this module's development.

Harley Schlichting, director
Amon Herd, associate director
Phyllis Miller and Dan Stapleton, assistant directors
Betty Gibb, assistant editor
Fiona Gammonley, graphic designer

TABLE OF CONTENTS

Pictorial Drawings

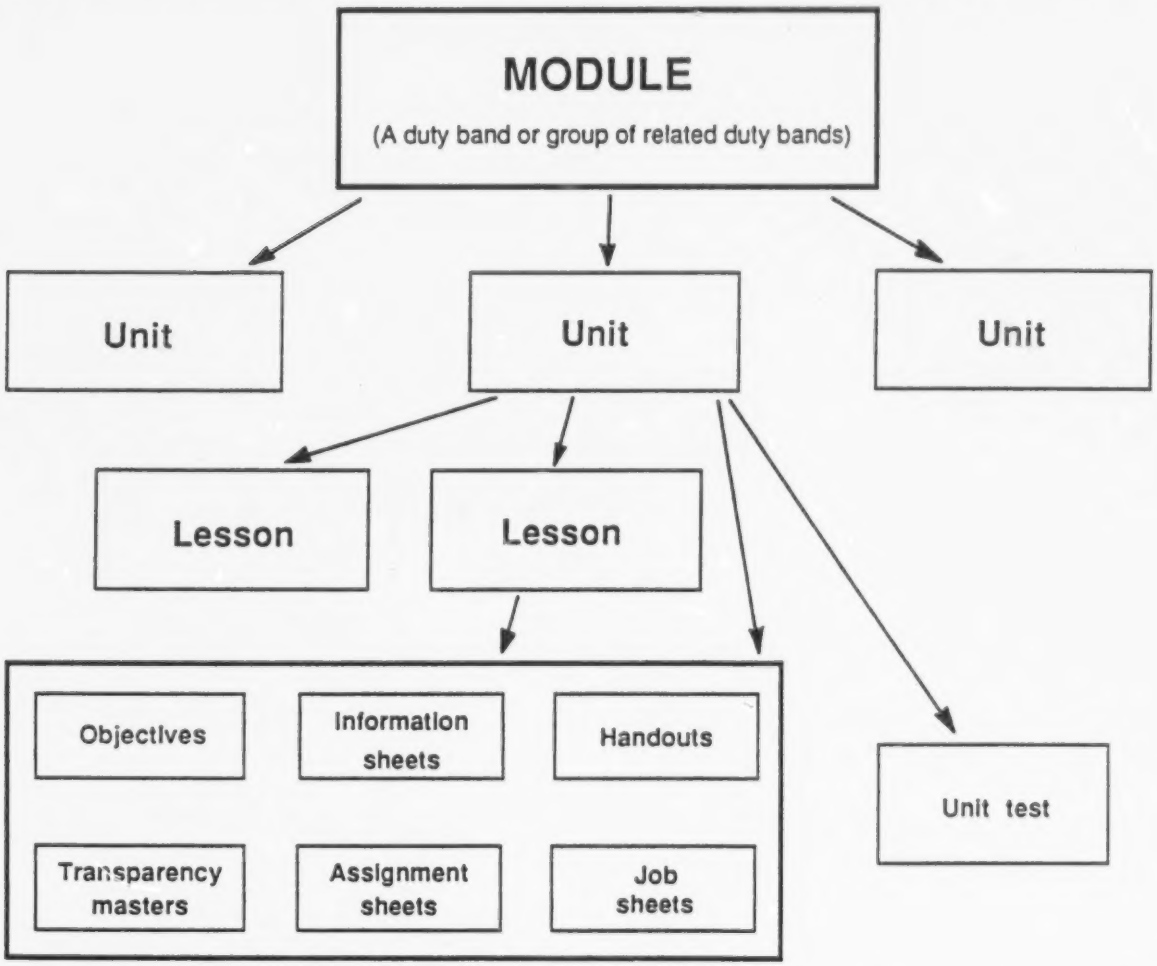
Unit I: Pictorial Drawings 1

HOW TO USE THIS PUBLICATION

GUIDE COMPONENTS

Units of instruction

This Drafting guide contains ten modules of instruction. Within each module are instructional units including some or all of the following components: performance objectives, information sheets, transparency masters, handouts, assignment sheets, job sheets and a unit test. Special instructions on audiovisuals, supplies, etc. are included in the Notes to the Instructor section near the beginning of each unit.



Competency profile

On the Missouri competency profile, tasks are divided into general subject areas, or duty bands, which are identified by a capital letter. Under each duty band are related tasks (competencies), which are identified by an Arabic numeral. To evaluate the student on performance of the competencies, a 3-2-1-N grading system is used, where:

- 3 = **Mastery** - can work independently with no supervision
- 2 = **Requires supervision** - can perform job completely with limited supervision
- 1 = **Not mastered** - requires instruction and close supervision
- N = **No exposure** - no experience or knowledge in this area

Cross-reference table (color-coded white)

Once the numbering system is understood, this table quickly reveals how the instructional components of the module relate to Missouri competencies. On the competency profile, tasks are divided into general subject areas, or duty bands, which are identified by a capital letter. Under each duty band are related tasks (competencies), which are identified by an Arabic numeral.

On the cross-reference table, unit numbers are represented by Roman numerals (I, II, III, etc.). Lessons within a unit are shown with Arabic numerals. Therefore, the first objective in Lesson 1 is numbered 1.1, the second is 1.2, etc. Other components of the module (transparencies, handouts, assignment sheets and job sheets) also use this numbering system. By looking at the cross-reference table, the instructor can quickly determine what test questions or job sheets a student needs to receive an evaluation on a particular competency.

Objectives (color-coded white)

Each unit is based on performance objectives that state the measurable unit and specific behavioral or performance objectives that students are expected to achieve. Since the objectives of the unit provide direction for the teaching-learning process, it is important for the teacher and students to have a common understanding of the objectives. Teachers should feel free to add/adapt objectives which will fit the material to student and community needs. Supporting material will, of course, need to be added for any new objectives.

Table of contents, references, notes to the instructor (color-coded pink)

These pages have been coded pink for instructor use only. The reference section lists materials used as sources in developing the material. Special instructions on audiovisuals, supplies, etc., are included in the Notes to the Instructor section.

Information sheets (color-coded green)

Presented in outline form for clarity, these pages provide content essential for meeting the cognitive (knowledge) objectives in the unit. Students should study the information sheets before class discussion or completion of assignment sheets. **CAUTION** statements indicate possible equipment damage, while **WARNING** statements recommend procedures to avoid bodily injury. Handouts and transparency masters are noted in the information sheets for instructional use.

Transparency masters (color-coded white)

Transparencies provide information by visually reinforcing or clarifying ideas presented in the information sheets. They are effective when identification is necessary, and they direct students to the topic of discussion. Transparencies should be left on the screen only when topics shown are under discussion.

Handouts (color-coded white)

Whenever more detailed information than can be presented in a transparency is needed, a handout is used. Handouts give the students additional information that can be kept with their class notes or student references.

Assignment sheets (color-coded tan)

Assignment sheets furnish paper-and-pencil practice to develop the knowledge necessary as a prerequisite to skill development. They can be given to students for class completion or used as homework assignments. Answer sheets (color-coded pink) can be used by the student or instructor to check progress.

Job sheets (color-coded blue)

These evaluation instruments are provided for two purposes: to outline steps of procedure and to check student performance mastery. Job sheets begin with a list of tools and materials needed for the activity. Job sheets furnish potential employers with a picture of skills being taught and performance that might be reasonably expected from a vocational student. The spaces to the right of the page on a job sheet assist the instructor in evaluating a student on a particular activity. This 3-2-1-N grading system is the same as the one used on the competency profile.

Unit test (color-coded yellow)

Competency-based tests are designed to help eliminate subjective testing and to improve student evaluation and accountability. Specific competencies and test questions are linked on the answer key. These unit tests have been written to be used with computerized VAMS (Vocational Administrative Management System), using Scantron sheets for computer-recording of test answers.

The unit test may be eliminated if the competency was thoroughly evaluated by job sheets. However, an emphasis should be placed on cognitive as well as performance skills. If the objective or competency will be evaluated by a job sheet, it is often necessary to determine by a written test whether the student understands enough of the material to perform the job sheet.

SUGGESTED ACTIVITIES

The following list of suggested activities may be helpful, especially to the beginning instructor.

1. Provide students with objective sheet and information sheets.
2. Discuss unit and specific objectives.
3. Discuss information sheets, assignment sheets and/or job sheets, lesson by lesson.
5. Give students unit test.
6. After successful completion of the test, have students do job sheet(s).

Students should perform the following activities.

1. Read objective sheet.
2. Study information sheets.
3. Do assignment sheet(s).
4. Take unit test.
5. Do job sheets.

Drafting

Module: Pictorial Drawings

Cross-Reference Table of Instructional Materials

Competency	Unit	Instructional Objective	Transparency Master	Handout	Assignment Sheet	Job Sheet	Test Item	Notes
J-1	1	1.3, 1.4	1, 2		1-3		12-19	
J-2	1	1.1, 1.6 - 1.9					1, 8-10, 20-29, 32,33	
J-3	1	1.1, 1.2, 1.5					1, 3-7, 11-30-31	

MODULE: PICTORIAL DRAWINGS

UNIT I: PICTORIAL DRAWINGS

LESSON 1: PICTORIAL DRAWINGS

UNIT OBJECTIVE

After completion of this unit, the student should be able to sketch and draw presentation drawings. This knowledge will be evidenced by correctly performing the procedures outlined in the assignment sheets and by scoring ___ percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1.1 Match terms related to presentation drawings with the correct definitions.

1.2 Name three types of presentation sketches.

1.3 Arrange in order the steps of sketching.

1.4 Select true statements concerning ellipse construction

1.5 List places where presentation drawings are used.

1.6 Distinguish between the types of anxonometric drawings.

1.7 Select true statements concerning oblique drawings.

1.8 Identify types of perspectives.

1.9 Identify perspective views.

1.10 Demonstrate the ability to:

a. Construct conceptual presentation sketches.

b. Construct an isometric drawing.

MODULE: PICTORIAL DRAWINGS

UNIT I: PICTORIAL DRAWINGS

CONTENTS OF THIS UNIT

A. Objective sheet

B. References

C. Notes to the instructor

D. Lesson plans

1. Lesson 1: PICTORIAL VIEWS

   a. Information outline

   b. Transparency masters

      TM 1.1: Sketching Order
      TM 1.1A: Overlay
      TM 1.1B: Overlay
      TM 1.2: Ellipses
      TM 1.3: Catalog Presentation Drawing
      TM 1.4: Sales Literature Presentation Drawings
      TM 1.5: Technical Report Presentation Drawings
      TM 1.6: Axonometric Drawings
      TM 1.7: Oblique Drawings
      TM 1.8: Types of Perspectives
      TM 1.9: Perspective Views

   c. Assignment sheets

      AS 1.1: Construct Conceptual Presentation Sketches
      AS 1.2: Construct Design Sketches
      AS 1.3: Construct an Exploded Assembly Presentation Drawing

E. Unit test

F. Answers to unit test

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13. Drawing Sheet Size and Format. New York, N.Y. 10017: The American Society of Mechanical Engineers, 1975.

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NOTE: This can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

15. The Kodak Compass. Eastman Kodak Company, Rochester, N.Y. 14650

NOTES TO THE INSTRUCTOR

A. Suggested approaches to teaching this unit

1. Suggest alternate problems for use in AS 1.1.
2. Allow students to select projects in which they have an interest for the conceptual sketches.
3. Allow students to show and discuss their with the class.
4. Several solutions could be submitted for each problem by each student in AS 1.2.
5. Have students discuss advantages and disadvantages of each problem in AS 1.2.
6. Recommend that students work in teams and trace other students' parts for the exploded assembly. This will allow larger projects to be completed if time is a problem.
7. Impose a time limit to force students to think and draw quickly.

8. Have students construct three-point perspectives after they have constructed two-point perspectives.

9. Have students select problems for AS 1.3 from past set of assembly drawings.

10. Invite a local architect to show his/her presentation drawings, and discuss when presentation drawings are needed and the amount of time used in making these drawings.

11. Invite a commercial artist to demonstrate the type of rendering that he/she commonly uses.

MODULE: PICTORIAL DRAWINGS

UNIT I: PICTORIAL DRAWINGS

LESSON 1: PICTORIAL DRAWINGS

I. Terms and definitions

A. **Conceptual sketches**--recording and communicating technical ideas that are in the process of development

B. **Design sketches**--carefully drawn sketches prepared to be given to someone else to make detail drawings

C. **Exploded assembly drawing**--drawing showing all parts in relationship with each other and how they fit together

D. **Freehand technical sketching**--freehand (without instruments) drawing of technical ideas.

E. **One-point perspective**--has only one vanishing point and the frontal plane of the object is parallel to the picture plane

F. **Perspective**--pictorial drawing made by the intersection of the picture plane with lines of sight meeting from points on the object to the point of sight

G. **Pictorial drawing**--three-dimensional drawing in axonometric, oblique, or perspective to imitate a picture of an object

H. **Presentation sketch or drawing**--sketch, mechanical drawing, or rendering designed to illustrate a technical subject and help sell or clarify its idea to a client

I. **Shading**--simple exterior embellishments using light effects to enhance the pictorial qualities of an object

J. **Three-point perspective**--has three vanishing points

K. **Two-point perspective**--has two vanishing points

NOTE: These points are identified as vanishing point right (VPR) and vanishing point left (VPL)

II. Types of presentation sketches

A. Conceptual

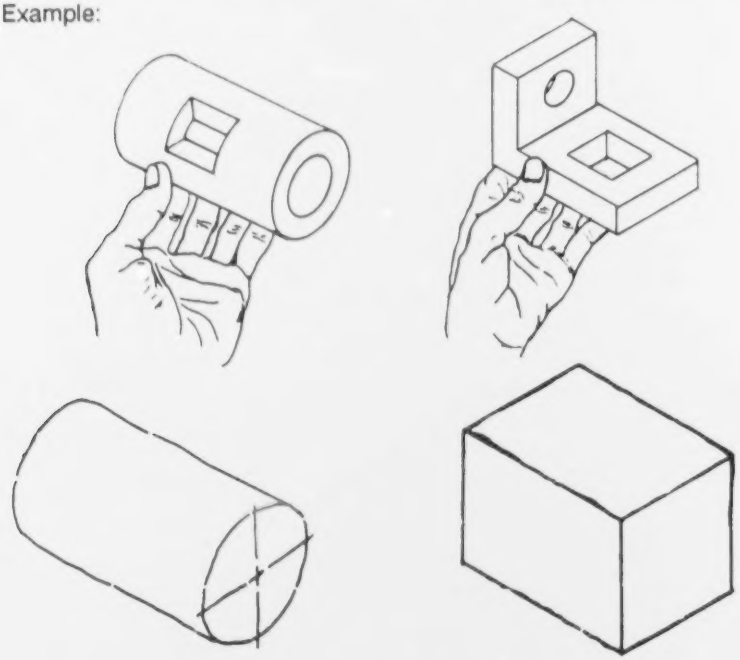
B. Design

C. Presentation

III. Steps of sketching (TM 1.1)

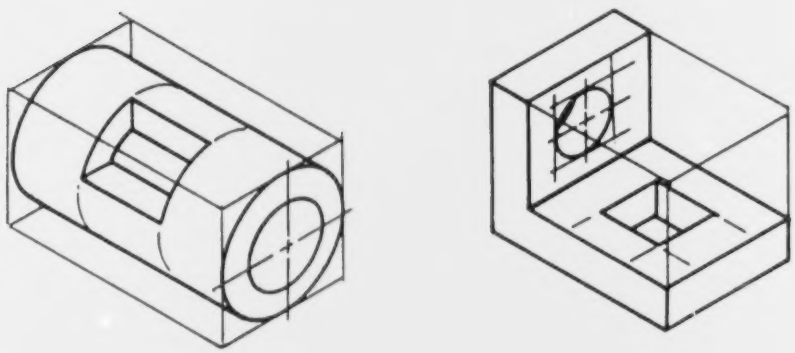
A. Sketch light construction of an enclosing box or cylinder in proportion

Example:



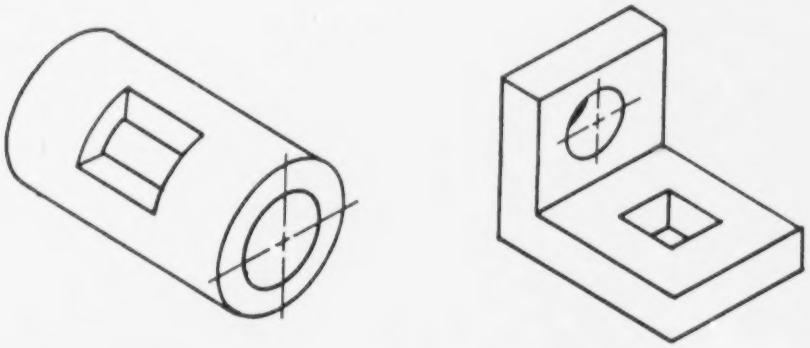
B. Block in object proportionately with light construction lines

Example:



C. Clean up unnecessary construction lines with an eraser and darken final visible lines

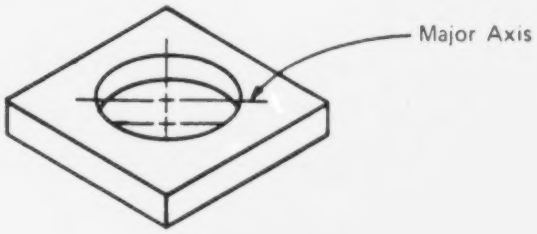
Example:



IV. Ellipse construction (TM 1.2)

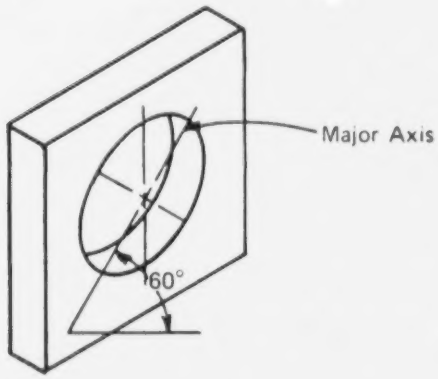
A. On horizontal (top) plane, major axis is horizontal

Example:



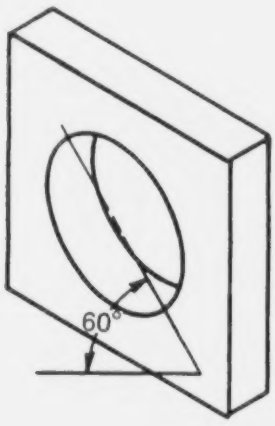
B. On right side plane, major axis is 60° from horizontal

Example:



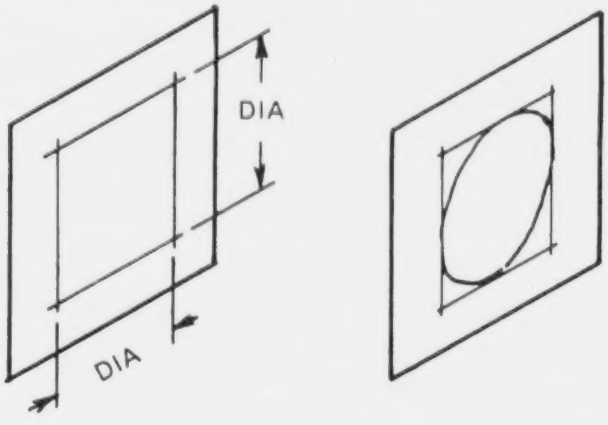
C. On left side plane, major axis is 60° from horizontal

Example:



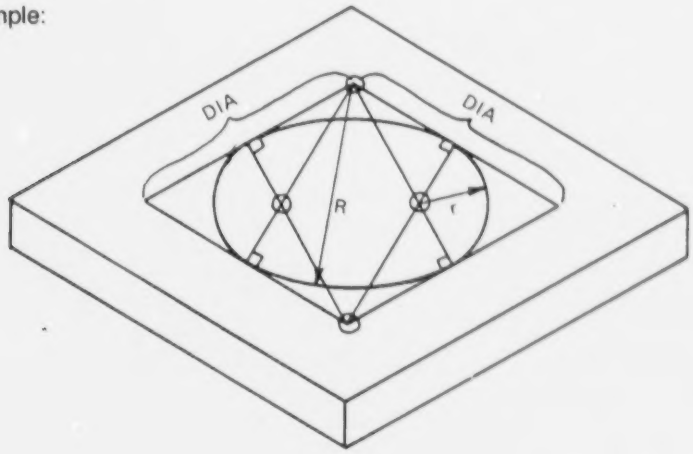
D. Diameter of circle is boxed in, and ellipse is sketched

Example:



E. Perpendicular bisector of each side of box is found and drawn mechanically with straight edge and compass

Example:



V. Places where presentation drawings are used (TM 1.3-1.5)

A. Catalogs

B. Sales literature

C. Proposals

D. Technical reports

E. Patents

F. Parts books

VI. Types of axonometric drawings (TM 1.6)

A. Isometric

1. Width, height, and depth on equal scale

2. All angles are equal

3. 120° between axes

B. Diametric

1. Width and height full scale

2. Two angles are equal

3. Two dimensions are equal

C. Trimetric

1. Width, height, and depth are unequal

2. All axes are at different angles

3. All angles are unequal

4. Dimensions are unequal

VII. Oblique drawings (TM 1.7)

A. Cavalier--true length on all axis

B. Cabinet--half scale on depth axis

C. General--depth axis at any scale

NOTE: Circular view is normally drawn in front view--true size view.

VIII. Types of perspectives (TM 1.8)

A. One-point

B. Two-point

C. Three-point

IX. Perspective views (TM 1.9)

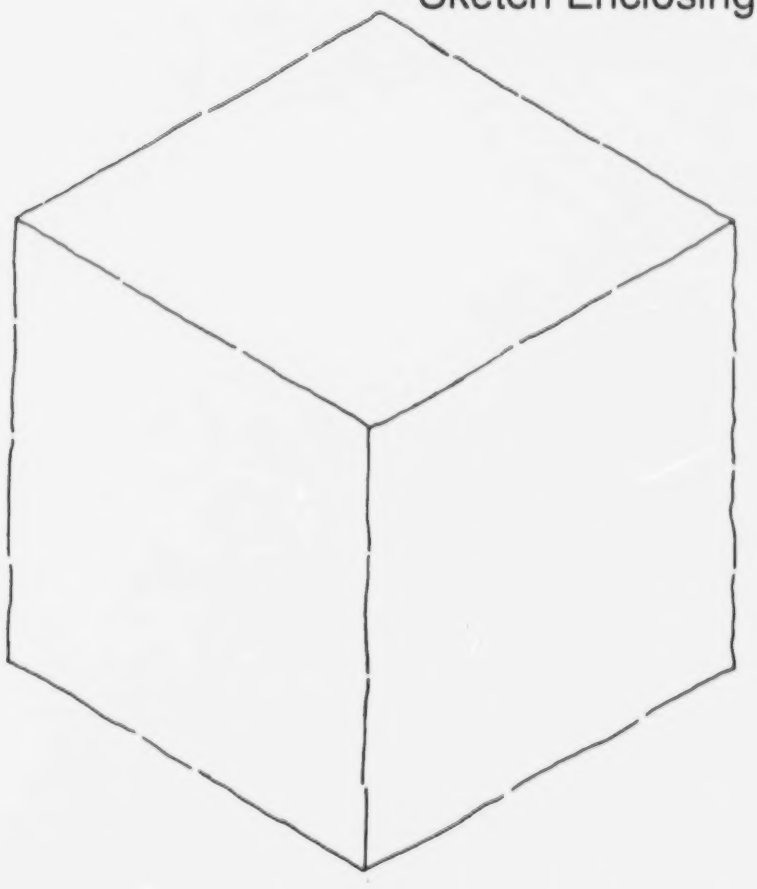
A. Above horizon (Worm's eye view)

B. Horizon (Person's eye view)

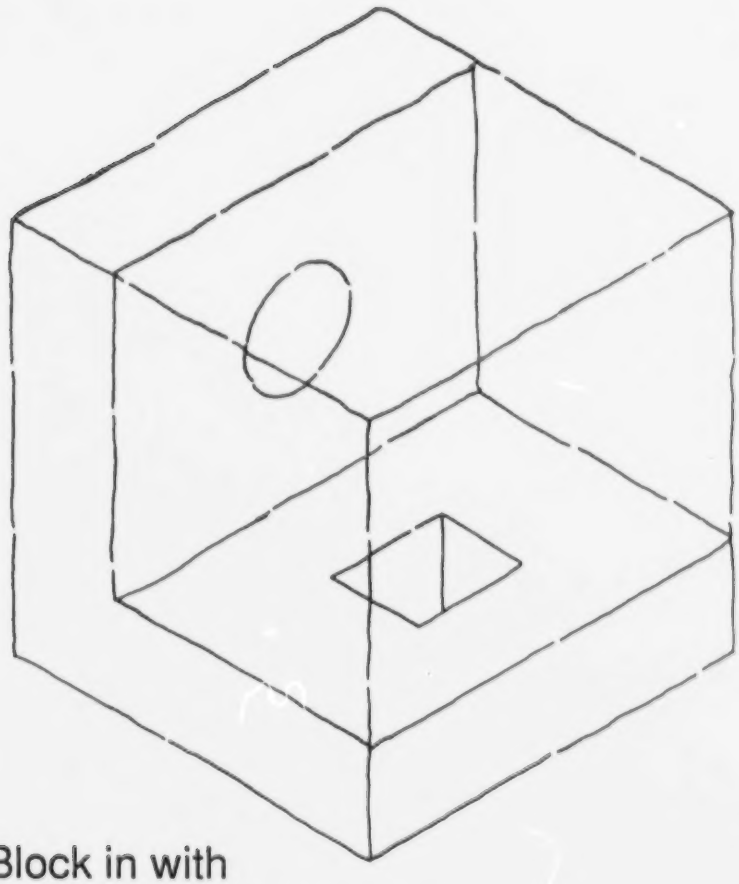
C. Below horizon (Bird's eye view)

Sketching Order

Sketch Enclosing Block

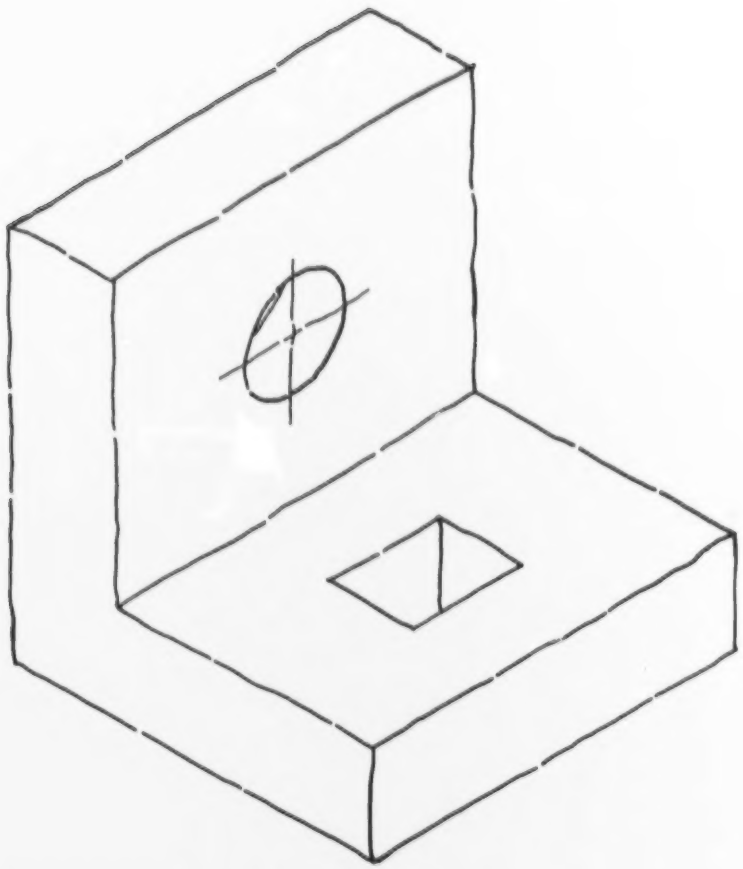


Sketching Order (cont.)



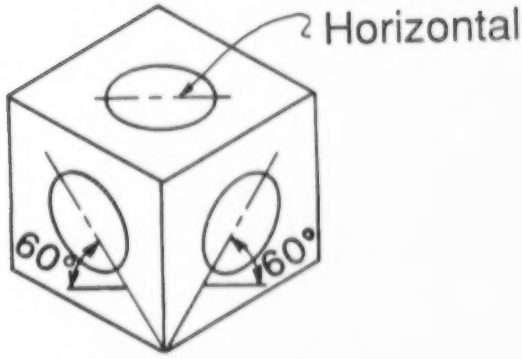
Block in with
Light Construction Lines

Sketching Order (cont.)

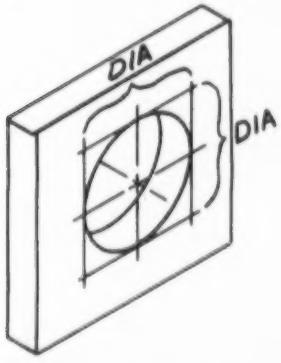


Erase Unnecessary Construction Lines, and Darken Final Visible Lines

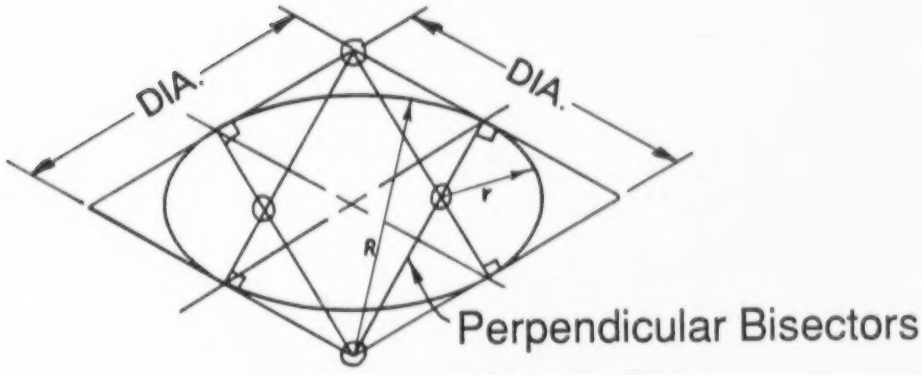
Ellipses



Ellipse Orientation



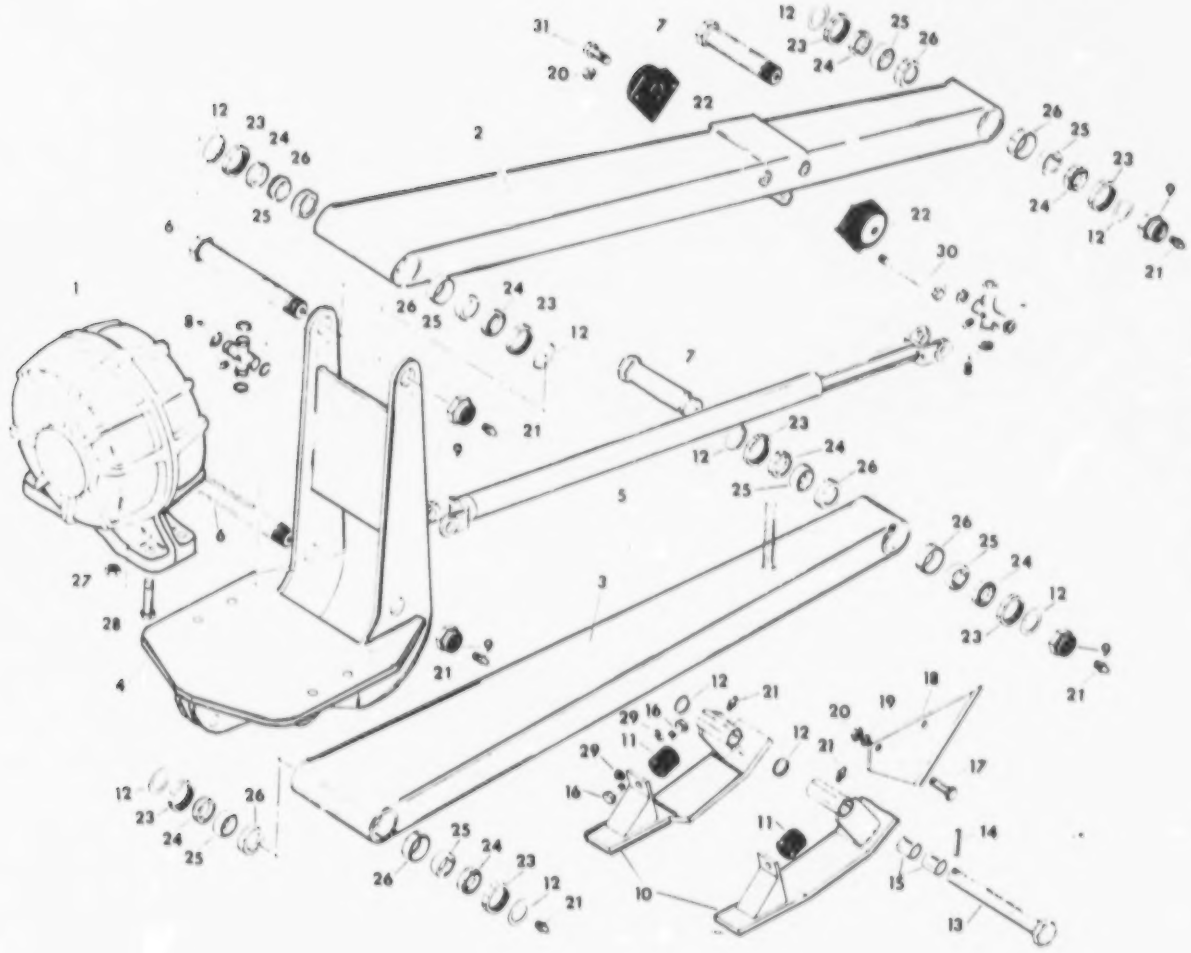
Sketch Box



4 Point
Approximate Ellipse

Catalog Presentation Drawing

Plow Frame



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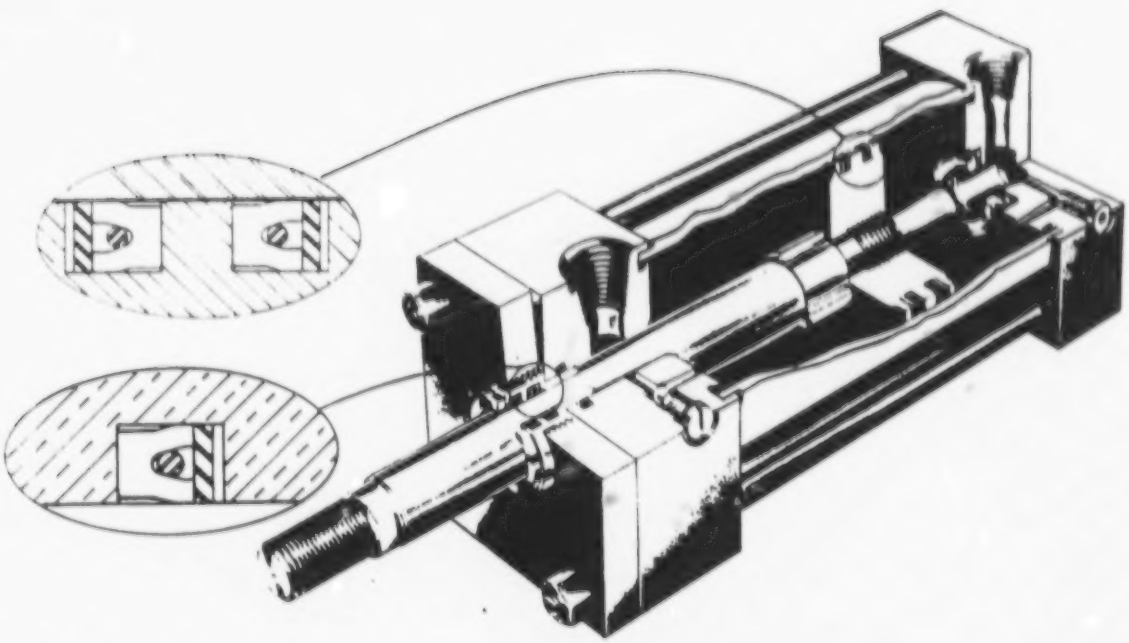
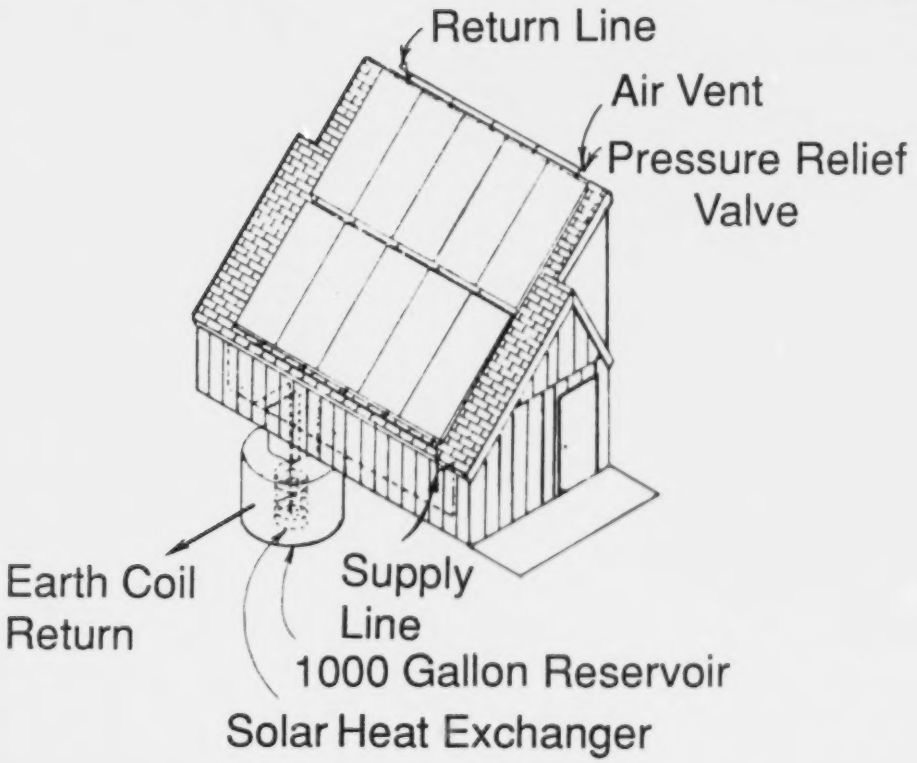
Sales Literature
Presentation Drawing

TM 1.4



Courtesy of Charles Machine Works, Perry, Oklahoma

Technical Report Presentation Drawing

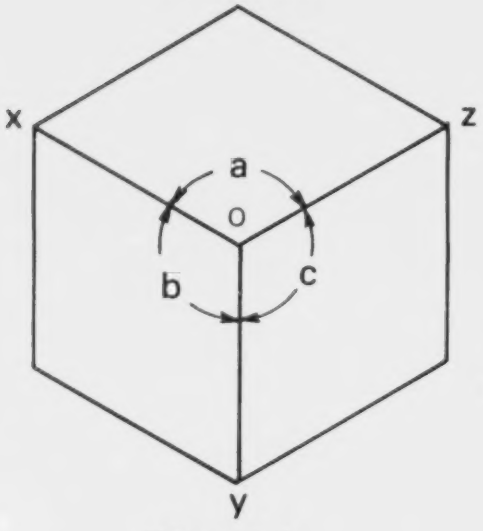


Solar Hut and Earth Coil Reservoir

Courtesy of Dr. James Bose, Oklahoma State University

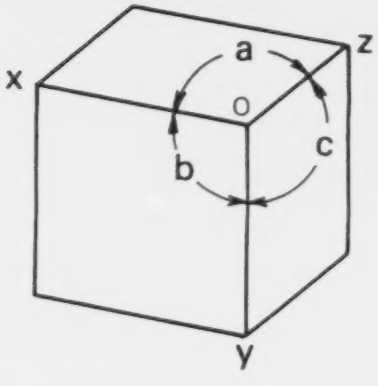
Axonometric Drawings

Isometric



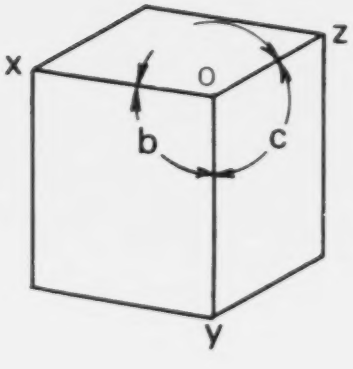
∠a = ∠b = ∠c
OX = OY = OZ

Dimetric



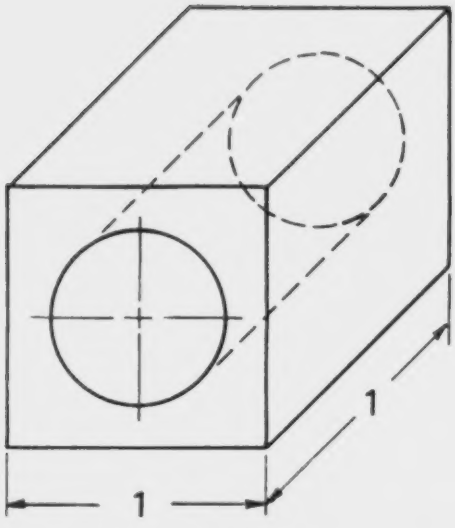
∠a = ∠c
OX = OY

Trimetric

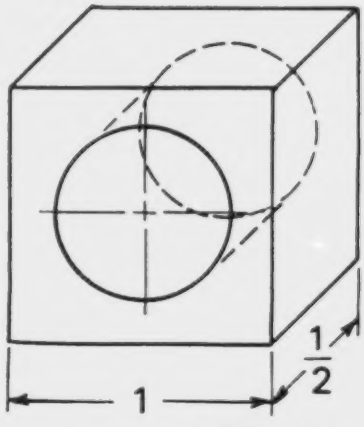


∠s a, b, and c are unequal
OX, OY, and OZ are unequal

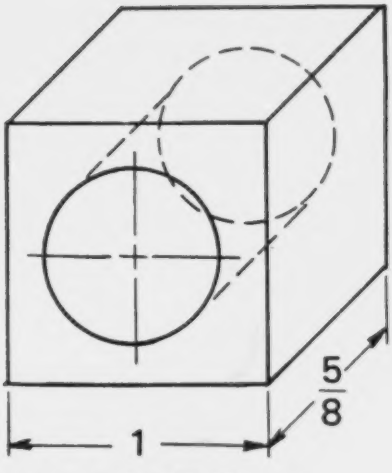
Oblique Drawings



Cavalier Oblique

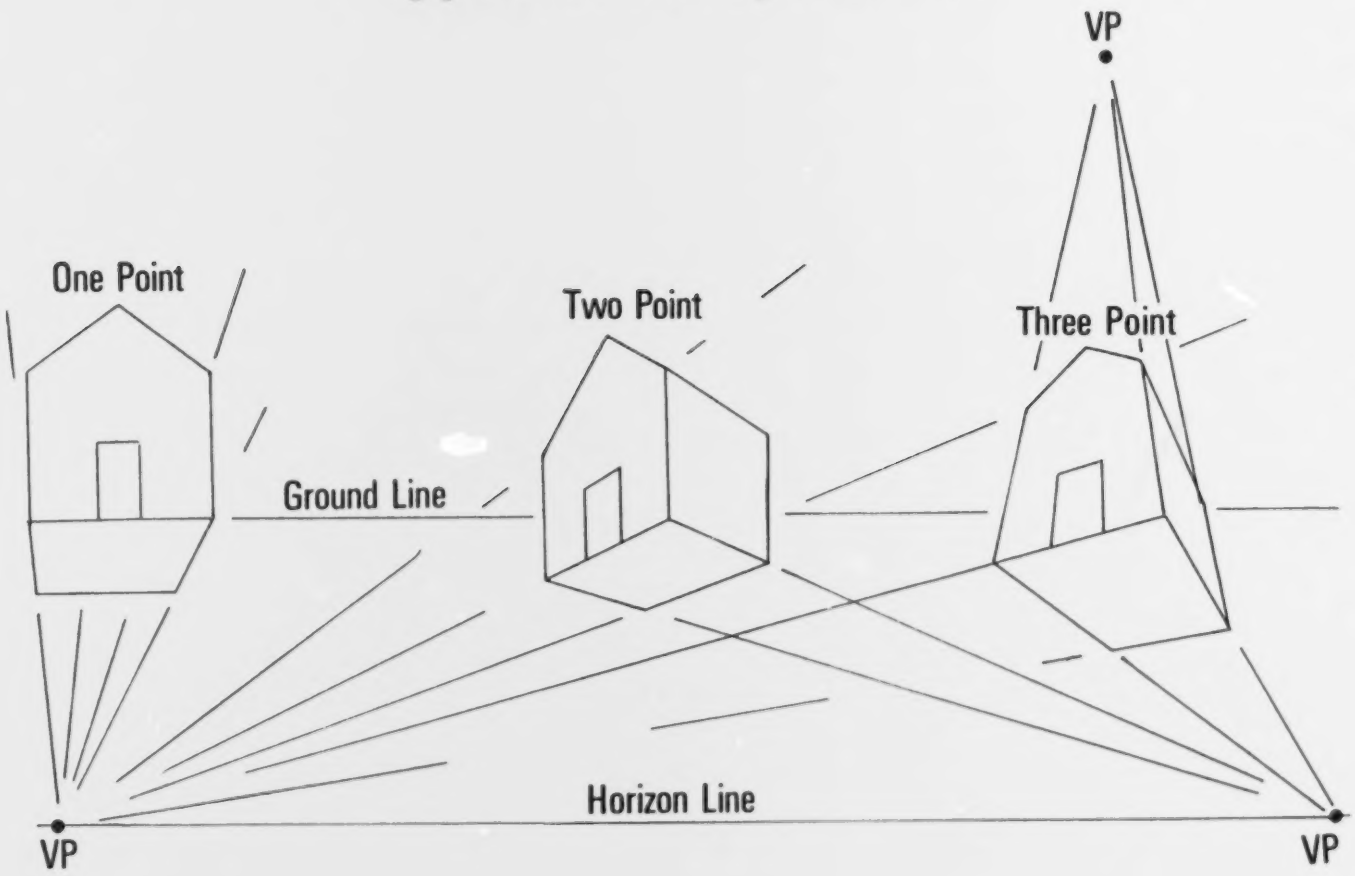


Cabinet Oblique

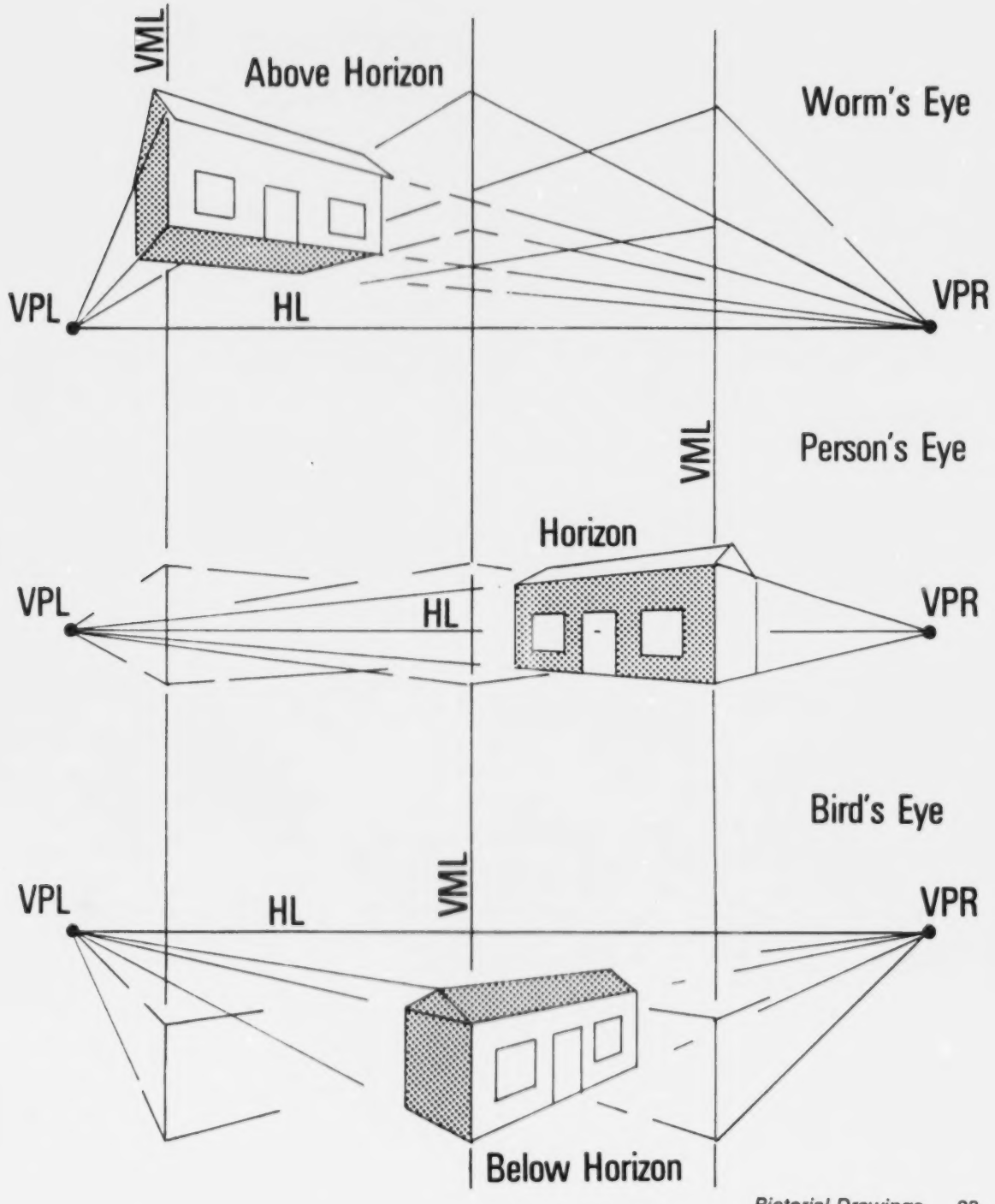


General Oblique

Types of Perspectives



Perspective Views



CONSTRUCT CONCEPTUAL PRESENTATION SKETCHES

Directions: On "A" size vellum or other media selected by instructor, construct conceptual sketches of one of the problems below to include the following: 1) applicable dimensions and notes, 2) parts identification, and 3) shape description.

Problems:

NOTE: Your instructor may wish to assign an alternate problem.

A. Design safety or security devices for fire or theft to help save lives and prevent injury

B. Design a new or improved educational aid for your instructor

C. Design an improvement in vehicle transportation or racing

D. Design a home improvement product

CONSTRUCT DESIGN SKETCHES

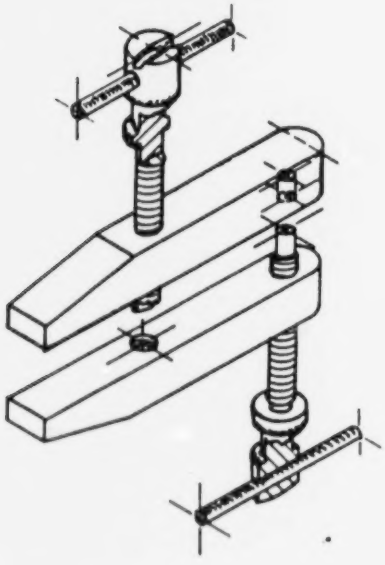
Directions: Using two sheets of "A" size vellum or other media selected by instructor, construct design sketches of two parts for one of the problems below or a problem from AS 1.1 to include the following: 1) shape description such as multiview and/or pictorial, 2) estimated size dimensions and notes, and 3) estimated material specifications.

NOTE: Make sketches complete enough so a drafter can make detailed drawings.

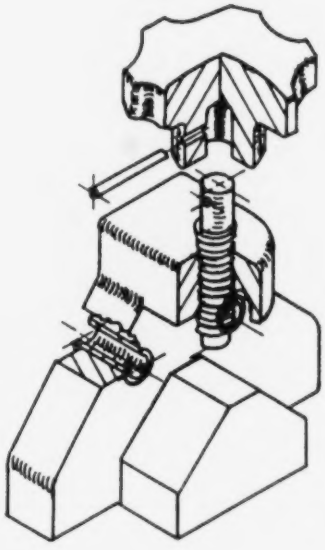
Problems:

NOTE: Your instructor may wish to assign an alternate problem.

A.



B.



CONSTRUCT AN ISOMETRIC DRAWING

Directions: On media selected by instructor, construct an isometric drawing of an assigned problem. Construct the drawing to scale using pencil or ink as instructed. You will need to select appropriate scale. Make a blueline print of your completed drawing, and turn in blueline print and original to instructor.

NOTE: You may be divided into teams to work on a large problem.

MODULE: PICTORIAL DRAWINGS

UNIT I: PICTORIAL DRAWINGS

UNIT I TEST

Match the terms on the right with the correct definitions on the left.

____	1. Simple exterior embellishments utilizing light effects to enhance the pictorial qualities of an object	a.	Freehand technical sketching
____	2. Pictorial drawing made by the intersection of the picture plane with lines of sight meeting from points on the object to the point of sight	b.	Conceptual sketches
		c.	Design sketches
		d.	Presentation sketch or drawing
		e.	Pictorial drawing
____	3. Freehand drawing of technical ideas without instruments	ab.	Shading
____	4. Carefully drawn sketches prepared to be given to someone else to make detail drawings	ac.	Exploded assembly drawing
		ad.	Three-point perspective
____	5. Drawing showing all parts in relationship with each other and how they fit together	ae.	Two-point perspective
____	6. Recording and communicating technical ideas that are in the process of development	bc.	One-point perspective
		bd.	Perspective
____	7. Three dimensional drawing in axonometric, oblique, or perspective to imitate a picture of an object		
____	8. Has only one vanishing point and the frontal plane of the object is parallel to the picture plane		
____	9. Has two vanishing points		
____	10. Has three vanishing points		
____	11. Sketch, mechanical drawing, or rendering designed to illustrate a technical subject and help sell or clarify its idea to a client		

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Arrange in order the following steps of sketching by placing the correct sequence of letters in the appropriate blanks.

a. = 1
b. = 2
c. = 3

____ 12. Block in object proportionately with light construction lines

____ 13. Clean up unnecessary construction lines with an eraser and darken final visible lines

____ 14. Sketch light construction of an enclosing box or cylinder in proportion

Select true statements concerning ellipse construction by placing an "a" in the appropriate blanks. Mark a "b" for false statements.

____ 15. On horizontal plane, major axis is horizontal

____ 16. On right side plane, major axis is 60° from horizontal

____ 17. On left side plane, major axis is 45° from horizontal

____ 18. Diameter of circle is boxed in, and ellipse is sketched

____ 19. 45° bisector of each side of box is found and drawn mechanically with straight edge and compass

Distinguish between the types of axonometric drawings by placing an "a" next to the characteristics of isometric, a "b" next to the characteristics of dimetric, and a "c" next to the characteristics of trimetric.

____ 20. 120° between axes

____ 21. All angles are unequal

____ 22. All axes are at different angles

____ 23. Two angles are equal

____ 24. All angles are equal

____ 25. Width and height full scale

____ 26. Width, height, and depth are unequal

Select true statements concerning oblique drawings by placing an "a" in the appropriate blanks. Mark a "b" for false statements

____ 27. Cabinet obliques are drawn half scale on the depth axis

____ 28. General obliques can be drawn full scale on the depth axis or other scales

____ 29. Cavalier obliques are drawn half scale on the depth axis

30. **Name three types of presentation sketches.**

a. _____

b. _____

c. _____

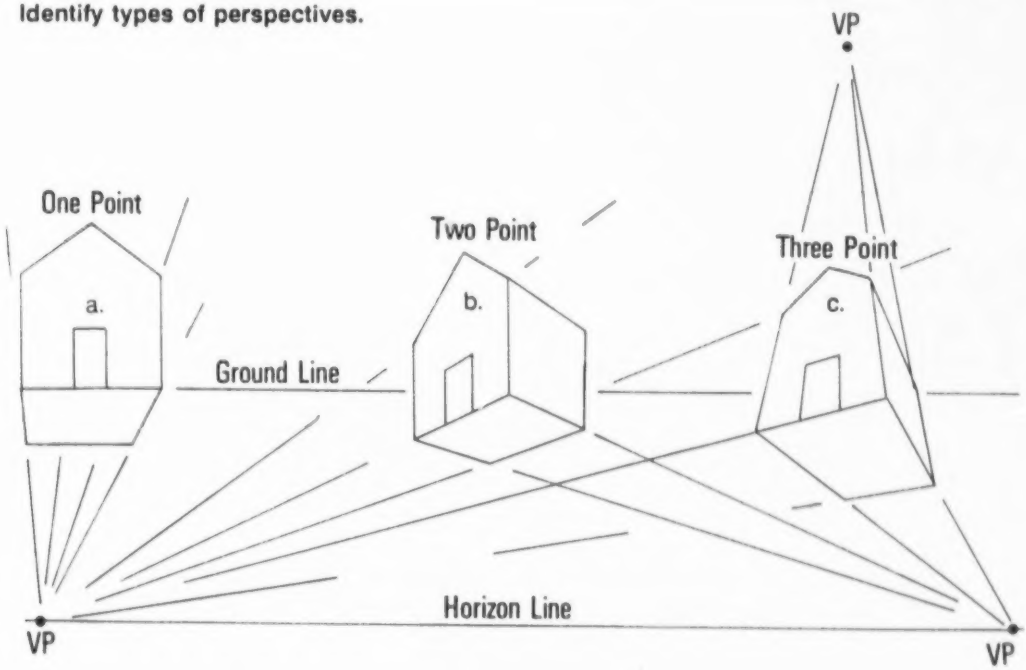
31. **List three places where presentation drawings are found**

a. _____

b. _____

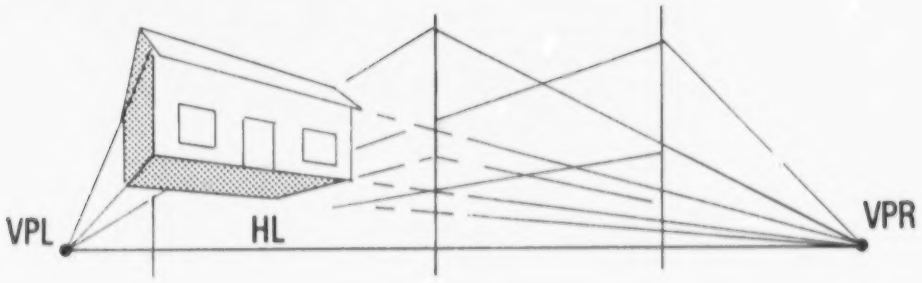
c. _____

32. **Identify types of perspectives.**



a. _____ b. _____ c. _____

33. **Identify perspective view.**



a. _____

ANSWERS TO UNIT I TEST

1.	ab	(J-3)
2.	bd	(J-2)
3.	a	(J-3)
4.	c	(J-3)
5.	ac	(J-3)
6.	b	(J-3)
7.	e	(J-3)
8.	bc	(J-2)
9.	ae	(J-2)
10.	ad	(J-2)
11.	d	(J-3)
12.	b	(J-1)
13.	c	(J-1)
14.	a	(J-1)
15.	a	(J-1)
16.	a	(J-1)
17.	b	(J-1)
18.	a	(J-1)
19.	b	(J-1)
20.	a	(J-2)
21.	c	(J-2)
22.	c	(J-2)
23.	b	(J-2)
24.	a	(J-2)
25.	b	(J-2)
26.	c	(J-2)
27.	a	(J-2)
28.	a	(J-2)
29.	b	(J-2)

30. The following in any order: (J-3)

a. Conceptual
b. Design
c. Presentation

31. Any three of the following: (J-3)

a. Catalogs
b. Sales literature
c. Proposals
d. Technical reports
e. Patents
f. Parts books

32. a. One-point (J-2)
b. Two-point
c. Three-point

33. A. Above horizon (Worm's eye view) (J-2)